7th International Conference on the Foundations of Systems Biology in Engineering  
FOSBE 2018

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The 7th FOSBE conference was held August 5-8 at the Hilton Chicago Oak Brook Hills Resort & Conference Center, in Chicago, Illinois. The conference was sponsored by CACHE, with technical co-sponsorship from IFAC Biosystems and Bioprocesses (TC 8.4), AIChE’s Society of Biological Engineering, and IEEE’s Control Systems Society. 83 participants from 11 countries met for the event; approximately 5% of participants were from industry and 43% were from countries outside the U.S. The meeting opened with a welcome reception Sunday evening, which was followed by Dr. Nathan Price, Systems Biology Institute, delivering the conference-opening lecture, “Mining Personal, Dense, Dynamic Data Clouds to Enhance Health and Drive Discovery”.

The Monday program started with the session “Modelling of Complex Biological Systems” which included presentations from Dr. Laurence Yang (Dr. Bernhard Palsson’s group, UCSD), Dr. Chris Rao (UIUC), and Dr. Alejandro Fernandez Villaverde (Dr. Julio Banga’s group, IIM-CSIC, Spain). This was followed by the session “Industrial Applications of Systems and Synthetic Biology” to highlight industry needs and success stories in this field. The three presenters of this session were Dr. Steve Brown (Lanzatech), Dr. Loveleena Bansal (GSK), and Dr. Will Cao (Ginkgo Bioworks). The first of two poster sessions took place over lunch (more details below). “Multi-scale and Multi-omics Experimentation, Data Integration, and Modelling” was the early afternoon session theme, with presentations from Dr. Uwe Sauer (ETH Zurich, Switzerland), Dr. Casim Sarkar (University of Minnesota), and Dr. Jin Wang (Auburn University). The late afternoon session was entitled “Network Inference and Modeling” and included presentations by Dr. Chris Henry (Argonne), Dr. Steffen Klamt (Max Planck Institute, Magdeburg, Germany), and Mr. Joseph Muldoon (Dr. Neda Bagheri’s group, Northwestern University). Conference participants were given Monday evening to enjoy the Chicago area.

The Tuesday morning program kicked off with a session focusing on “Synthetic Biology” and speakers Dr. Huimin Zhao (UIUC), Dr. Joshua Leonhard (Northwestern University), and Dr. In Young Hwang (Dr. Matthew Chang’s group, National University of Singapore). This was followed by presentations by Dr. Yann Dafour (Michigan State University), Dr. Hana El-Samad (UC San Francisco), and Mr. Yannik Schaelte (Dr. Jan Hasenauer’s group, Helmholtz Zentrum-Munich, Germany) in the session “Next Generation Networks and
Tools”. For the second time, posters were presented alongside lunch. A panel discussion on “Future Funding Directions” was held on early Tuesday afternoon. The panel discussion included panelists Dr. David Babson (DoE/USDA), Dr. Haluk Resat (NIH), and Dr. Ruth Shuman (NSF). This discussion forum was followed by the late afternoon session focusing on “Systems Biology of Cellular Functions”. This session included presentations by Dr. Matthias Heinemann (University of Groningen, The Netherlands), Dr. Brian Ingalls (University of Waterloo, Canada), and Ms. Lindsey Brown (Harvard University), a doctoral student in Dr. Frank Doyle’s group.

The Systems Biology Foundation Award recognizes an individual who has made pioneering contributions to engineering approaches in systems biology. The 2018 Foundation Award was presented to Prof. Hans Westerhoff, at the Universities of Amsterdam and at the University of Manchester. His award talk was entitled, “Non-Equilibrium Thermodynamics after all? Engineering Robustness through Diversity”, which provided historical perspective, and glimpses of a potential future, in systems biology, while highlighting key insights derived from understanding biology across multiple scales from genes to systems. Tuesday evening ended with the conference banquet.

Wednesday began with talks from Dr. Krishna Mahadevan (University of Toronto, Canada), Dr. Jennifer Reed (University of Wisconsin), and Dr. Robert Duerr (Dr. Achim Kienle’s group, Max Planck Institute Magdeburg, Germany) in the area of “Systems and Synthetic Biology for Biotechnology”. This was followed by the last session of the conference on “Systems Medicine”. The presenters were Dr. Ali Cinar (IIT), Dr. Marc Birtwistle (Clemson University), and Mr. Florencio Serano Castillo (Dr. Bob Parker’s group, University of Pittsburgh). This was followed by the closing remarks.
43 Contributed papers, selected from 55 submissions, were presented in two poster sessions during the meeting. The FOSBE student poster competition was coordinated by Dr. Neda Bagheri (Northwestern University), who recruited half a dozen judges to evaluate the posters for technical and presentation quality. The final selection of winners was challenging because of the overall quality of work done by the students. Poster awards were given to Ms. Nan Papili Gao from ETH Zurich and Ms. Jessica Yu from Northwestern University.

The educational and training mission of the FOSBE meeting was accomplished through a half-day pre-meeting workshop for graduate students, post-doctoral researchers, junior faculty, and industry participants. Talks highlighted a variety of tools and approaches to systems biology research challenges. The workshop faculty included Drs. Joshua Leonard, Marc Birtwistle, Chris Rao, Casim Sarkar, and Jennifer Reed.

The overall quality of the presentations and posters made the 2018 FOSBE meeting an unqualified technical success. We gratefully acknowledge the Department of Defense Army Research Office, the National Science Foundation, and the US Department of Energy for their generous support. Other sponsorship and financial support of the FOSBE meeting was generously provided by Northwestern University and the journal Processes.

Thank you to all FOSBE attendees and supporters for making the 2018 meeting a success. We especially thank Ms. Robin Craven, who provided outstanding logistical and organizational support up to and through the conference.

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